Hawaii Clean Energy Initiative

Renewable Energy Zones
Solar Data and Maps

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Outline

- Data available for solar mapping
- Need for better solar map data – higher resolution, improved accuracy
- Steps to create new maps

Solar Station Types

- NREL/SUNY Satellite Model 10 km Grid
  - Hourly, 8 Years Data 1998-2005
  - GHI and DNI
- NREL NSRDB (TMY3) Surface Modeled
  - Hourly, 10 Stations, 15-45 Years, (1991-2005 or 1961-2005), GHI and DNI
- RAWS Surface Measured, Hourly, Recent Years, up to the present
  - GHI Only

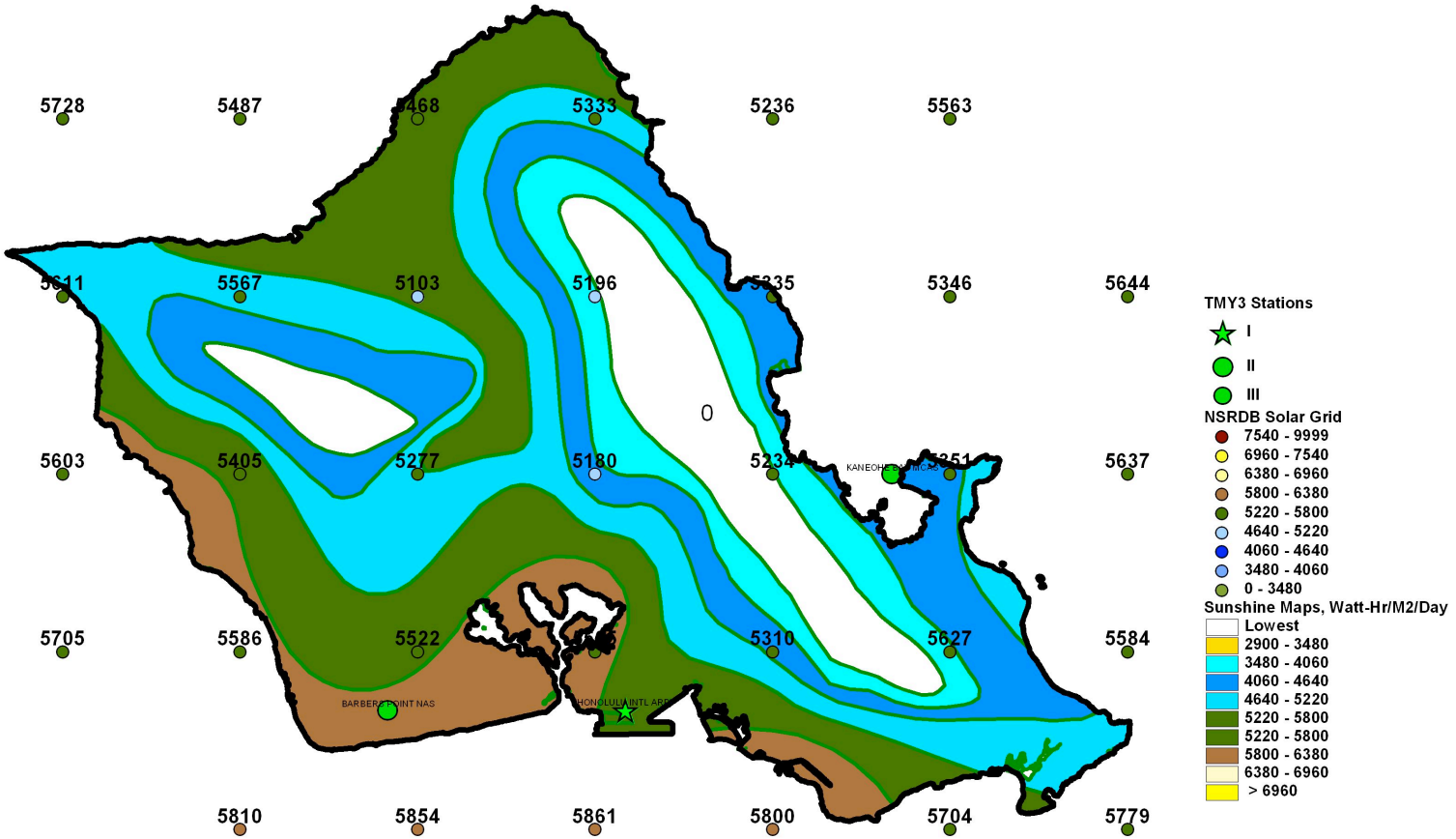
Solar Data Sources

- NREL/HECO high resolution GHI measurements at 4 sites
- HECO Solar Schools data
- Sunshine maps, including documentation of original research from the 1970s.
- Possible Satellite Modeled data from current model development projects (higher spatial resolution, more realistic algorithms.

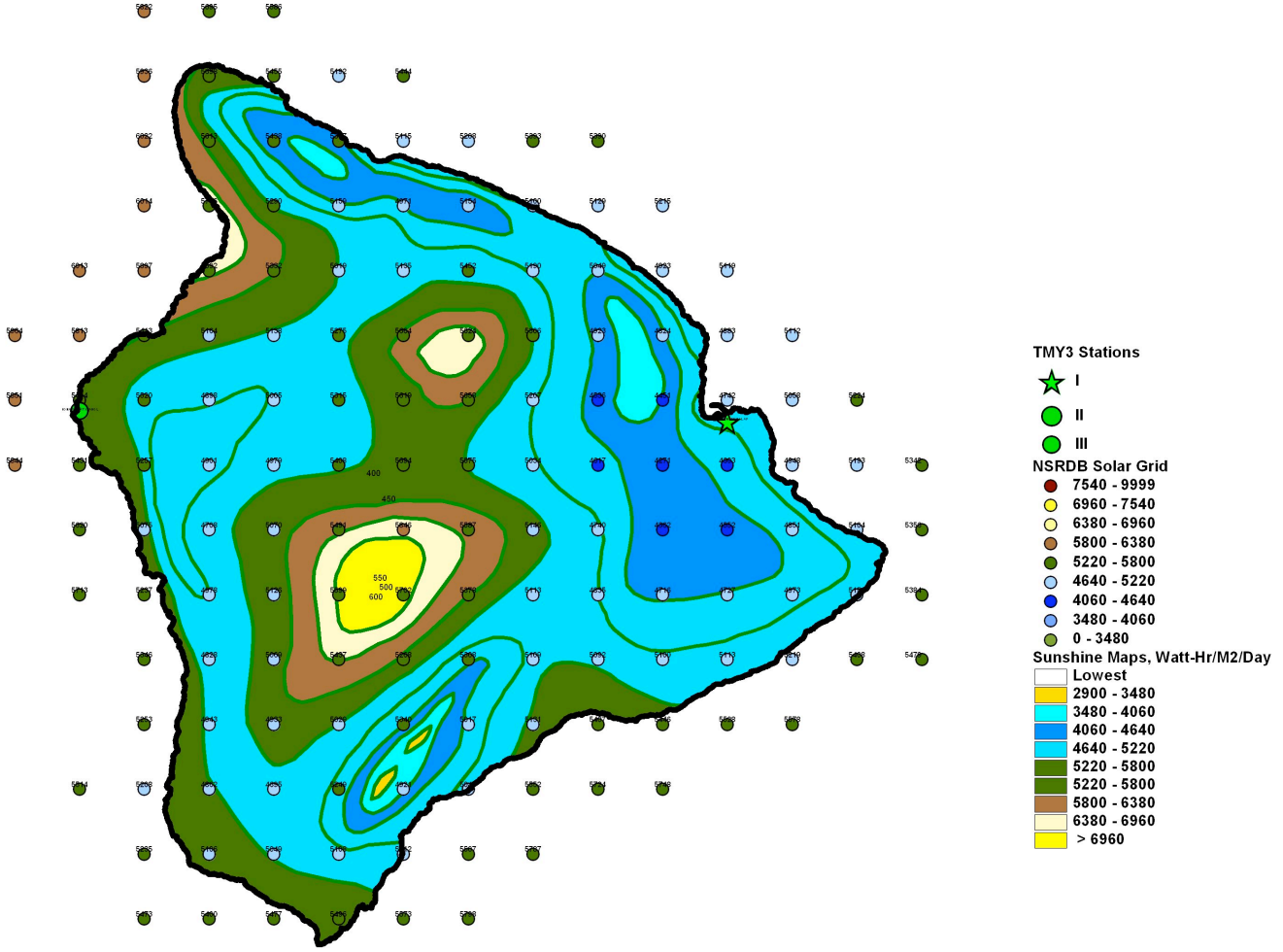
Supplemental Data Sources

- USGS high resolution terrain data.
- PRISM gridded high resolution rainfall maps for all Hawaiian Islands

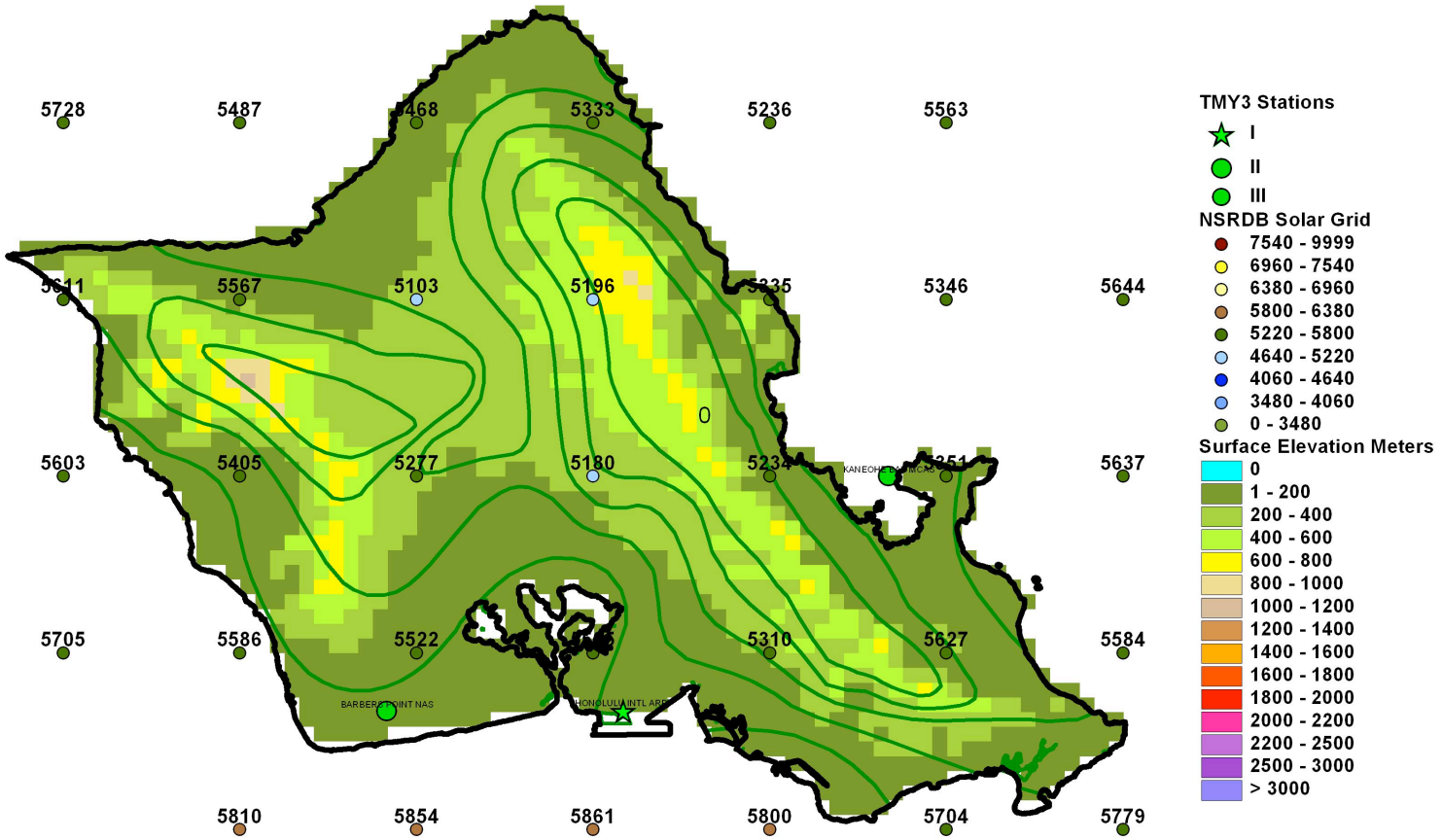
Oahu Sunshine Map
(Overlay is NSRDB Grid)



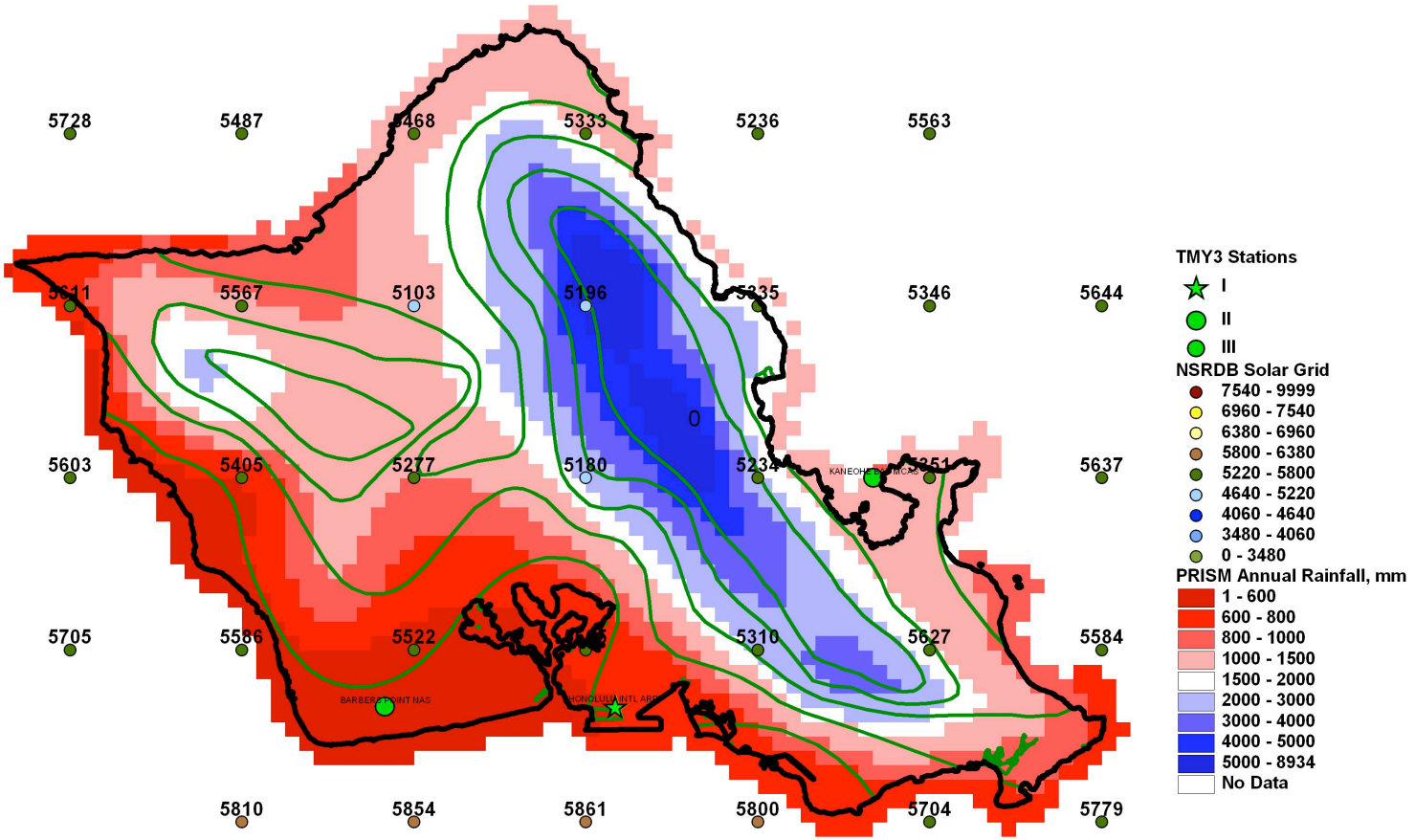
Hawaii Big Island Sunshine Map
(Overlay is NSRDB Grid)



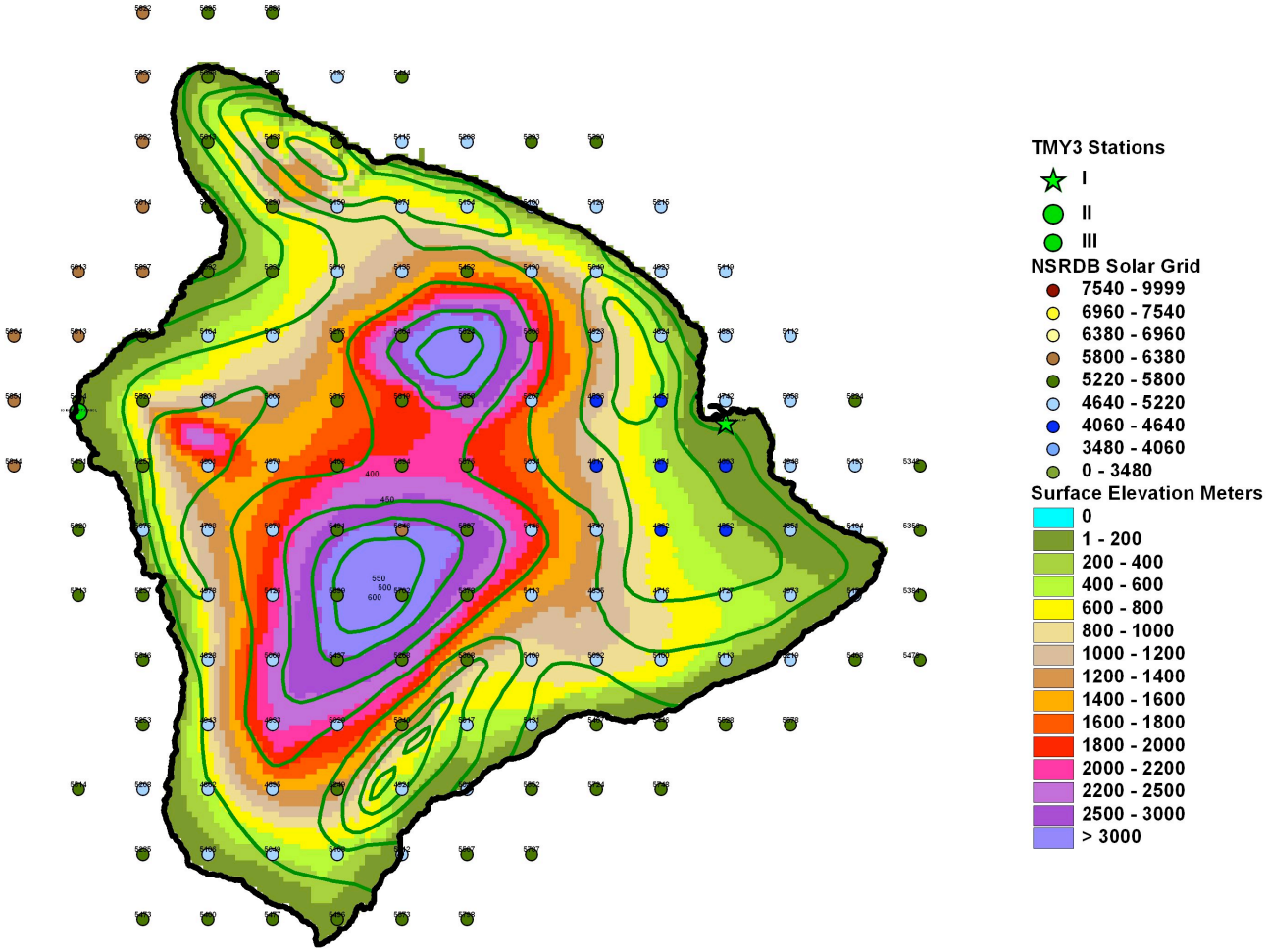
Oahu 1 KM surface Elevation
(Overlay is NSRDB Grid + Sunshine Map Contours)



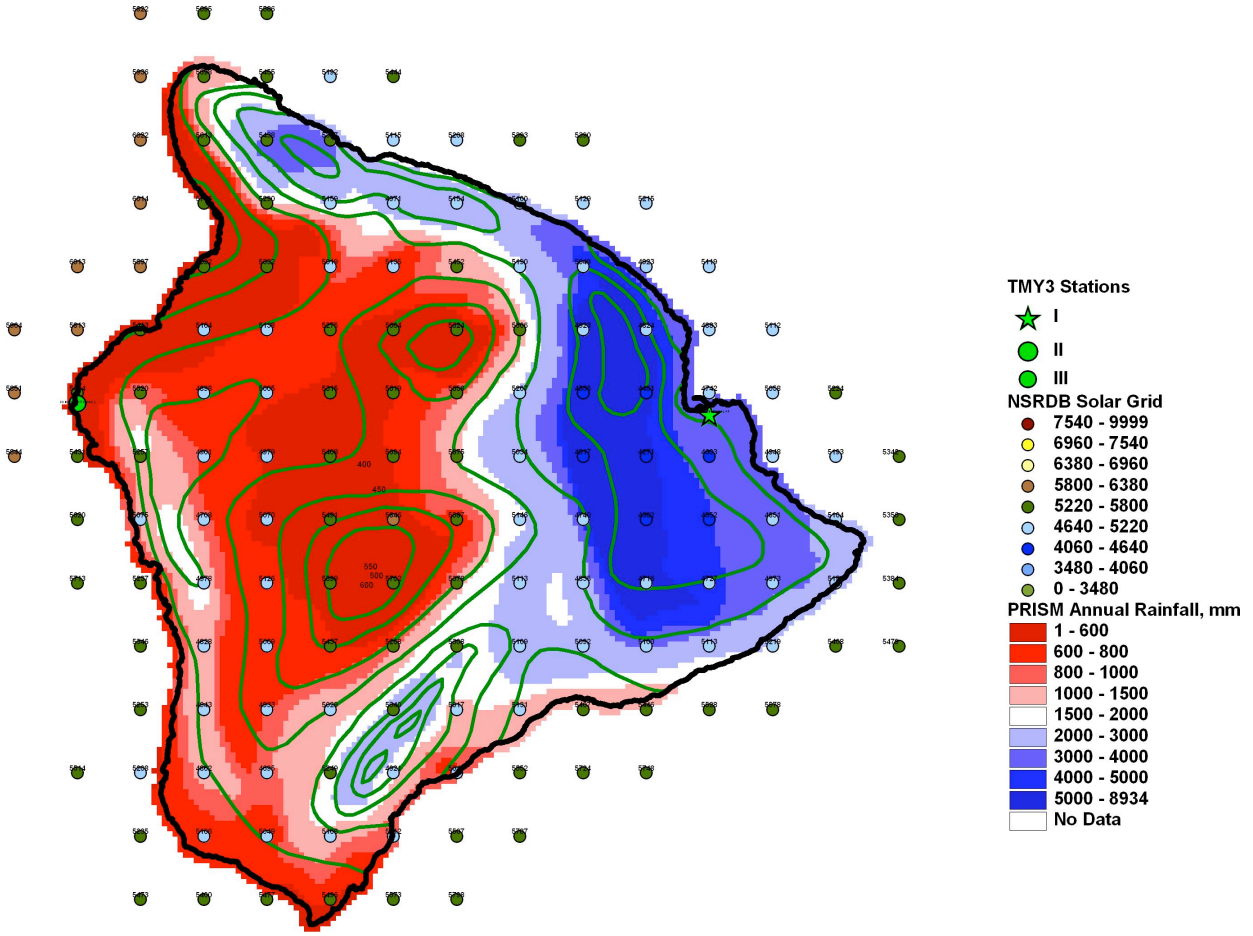
Oahu PRISM Annual Rainfall
(Overlay is NSRDB Grid + Sunshine Map Contours)



Hawaii Big Island 1 KM Terrain
(Overlay is NSRDB Grid + Sunshine Map Contours)



Hawaii Big Island PRISM Annual Rainfall
(Overlay is NSRDB Grid + Sunshine Map Contours)



Problems with existing solar data

- Sunshine maps – use of older data, some instruments may be inaccurate, map is subjective
- NSRDB station data – not enough locations, newer surface modeled data may be inaccurate
- NSRDB gridded satellite (Perez) data – 10 km grid too coarse for smaller islands, solar model has problems in areas with persistent clouds, 8 years is a short time period to use for climatological maps

Procedure for new maps - STRAWMAN

- Evaluate the process in the Sunshine Maps. Assess the mean values especially in mountainous areas.
- Estimate best longterm mean values near NSRDB stations. Include 10 KM Perez cells with 8 year means.
- If the NSRDB data points are consistent with Sunshine Maps, use them. If not…
- If bad data points also have high rainfall – use rainfall grids to create new solar values which are more consistent with Sunshine Maps.
- (Possibly) make 2 sets of high resolution grids, one which is interpolated from good NSRDB data points, the other from rainfall. Combine the two into one grid.

- Thank you…

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